

PROF. KARL SELIM LEMSTRÖM.

A S has already been announced, Prof. Karl Selim Lemström, whose name is known to our readers by his investigations on the aurora borealis and the influence of electricity on plant growth, died on October 2 after a short illness.

He was born in 1838 not far from Helsingfors, and entered the university in 1857, where he devoted himself to studies of physics and mathematics. His first scientific work, published in 1868, was founded on experiments made in Stockholm under the guidance of the late E. Edlund, the celebrated physicist, and dealt with the intensity curve of induction currents in relation to time, the intensity of the inducing current, &c. A summary was published in French in the *Proceedings* of the Swedish Academy of Sciences in 1870.

Lemström joined the late Baron A. E. Nordenskjöld's expedition to Spitsbergen in 1868 as physicist. In the two following years he worked in the laboratory of V. Regnault in Paris; in 1871 he made a journey to Lapland; in 1872 he continued his researches on the induction currents at the St. Petersburg Academy of Sciences. His papers during these years are printed in the *Proceedings* of the Swedish Academy and of the Finland Society of Sciences.

During the journey to Spitsbergen Lemström was engaged in observations on atmospheric electricity, terrestrial magnetism, and the aurora borealis. These observations, continued in Lapland, suggested to him a new theory of the last named phenomenon, so enigmatic even after the investigations of De la Rive, Loomis and others. This theory he expounded in a dissertation entitled "The Electrical Discharge in the Aurora and the Auroral Spectrum" (1873).

His next work, on the causes of terrestrial magnetism, was published in 1877. Starting from Edlund's well known theory on the nature of electricity, he argued that the rotation of the earth in an atmosphere of non-rotating ether causes the electric currents of which the terrestrial magnetism is a manifestation, and he described several experiments in confirmation of these views.

Appointed in 1878 professor of physics at the Helsingfors University, he continued his investigations on the aurora borealis in Lapland in 1882-4, where he organised two stations for taking part in the international polar exploration of these years. The investigations carried on by this expedition were published in a large work, "Exploration internationale des Régions polaires, &c.," of which vol. iii. (1898) contains his auroral researches.

One very interesting work by Lemström is devoted to the study of night frosts and the means to prevent their devastations, so frequent in Finland. Lemström emphasised the nocturnal radiation of heat as the principal cause of the night frosts, and showed that in calm and clear summer nights the air, cooled by the radiating soil and plants, must remain at the surface of the earth, and, flowing like water, gather on lower grounds, which generally are most exposed to frost. He proposed to prevent the radiation by artificial clouds of smoke, and invented for this purpose "torches" or tubes of peat (described in *Acta Societatis Scientiarum Fennicae*, Tome xx.).

Moreover, Lemström made important experiments on the influence of electricity on growing plants, on which subject he read a paper before the British Association at Bristol in 1898. The influence in question was found by exposing the plants to electric tension from a metallic wire net, provided with points and connected with the positive pole of a Holtz machine, the negative pole being conducted to the earth.

His frost experiments directed attention to the prevention of frost damage in several countries, and also gave rise to new scientific investigations (for instance, by Th. Homén). It is to be hoped that further work may be devoted to this important subject as well as to the electrocultural question, which have both but very little advanced from the point to which they were brought by the warm-hearted, indefatigable pioneer, Selim Lemström.

ARTHUR RINDELL.

NOTES.

IT was announced last week that the Royal Society of Edinburgh has awarded the Gunning Victoria Jubilee prize for 1900-4 to Sir James Dewar, F.R.S. We now learn that the following additional awards have been made:—the Keith prize for 1901-3 to Sir William Turner, K.C.B., F.R.S., for his memoir entitled "A Contribution to the Craniology of the People of Scotland," and for his "Contributions to the Craniology of the People of the Empire of India"; the Makdougall-Brisbane prize for 1902-4 to Mr. J. Dougall for his paper on an analytical theory of the equilibrium of an isotropic elastic plate; the Neill prize for 1901-4 to Prof. J. Graham Kerr for his researches on *Lepidosiren paradoxo*.

A VALUABLE collection of specimens illustrative of the fauna of the deep sea has recently been received at the British (Natural History) Museum as a gift from H.M. the King of Portugal. The collection is reported to include a number of deep-sea fishes, among which are sharks of considerable size, captured during His Majesty's recent cruise in Portuguese waters. Several of these may prove to have been previously unrepresented in the British Museum collection. King Carlos, like the Prince of Monaco, is much interested in the fauna of the deep sea, of which he himself has done much to increase our knowledge. The collection sent to the museum is also stated to contain a series of contributions to our knowledge of the deep-sea fauna from the pen of His Majesty.

THE sale of Chartley Park, Staffordshire, the hereditary seat of Lord Ferrers, involves also a change of ownership of the remnant of the celebrated herd of white cattle which have been kept there for the last 700 years. It is much to be regretted that the cattle could not have gone with the park, and have been maintained there by the new owner; but as this is not to be, it is to be hoped that they will be given a safe home elsewhere, where they will flourish and increase. It was long considered that the herds of wild cattle in various British parks were direct descendants of the wild aurochs, but it is now generally admitted (largely owing to the writings of Mr. Lydekker) that they are derived from domesticated albino breeds nearly allied to the Pembroke and other black Welsh strains, some of which show a marked tendency to albinism. This view, as pointed out by a writer in the *Times* of November 29, is strongly supported by the fact that the Chartley cattle frequently produce black calves. The theory advocated by a later writer in the same journal that the British park cattle are the descendants of a white sacrificial breed introduced by the Romans rests upon no solid basis. The Chartley cattle, believed to be reduced to nine head, are to be captured by the purchaser—no easy task.

THE anniversary dinner of the Royal Society was being held last week as we went to press. In proposing the toast of the Royal Society, Mr. Arnold-Forster said that every day he has lived in a public office he has been more and more impressed with the need for a greater knowledge in our

public life of what men of science are thinking, what they are doing, and what they hope and mean to accomplish in all the great departments of scientific life throughout the globe. There is absolutely infinite opportunity for the work of trained minds in that important department of our national life, the public service. Even in his short official life he had lived to see some progress made in the direction in which he wished to see this nation travel. Sir William Huggins responded; and among other speakers were Lord Strathcona, Sir J. W. Swan, Mr. W. Bateson, and Mr. Leonard Courtney.

THE annual dinner of the Institution of Electrical Engineers was held on Thursday last, December 1, Mr. Alexander Siemens, the president, being in the chair. In proposing the toast of the institution, Lord Alverstone remarked that its high standing among scientific organisations was due to the fact that it had kept pace with the times, had been the first to promulgate and promote among its members all the information about electrical science that could be obtained, had been willing to welcome electricians from all parts of the world, had kept its students and its members acquainted with every modern development, and had given them the means of cultivating the technical knowledge of their science to the highest extent. In the course of his response to the toast, the president announced that telegrams of congratulation and sympathy had been received from the Belgian and Italian Societies of Electrical Engineers. In their visits to foreign countries the international character of electrical engineering had come out, and it was this which had contributed not a little to the development of electricity throughout the world.

THE death is announced of Dr. T. M. Drown, president of Lehigh University, and previously professor of chemistry at Lafayette College and the Massachusetts Institute of Technology.

IT is reported in the *Pioneer Mail* that the Secretary of State for India has sanctioned the creation of the appointment of electrical adviser to the Government of India, with headquarters at Calcutta. The present post of electrical engineer to the Government of Bengal will be abolished.

ACCORDING to the correspondent of the *Daily Chronicle* (November 25) the German Commission that is investigating tuberculosis has come to the conclusion that two distinct forms of tubercle bacilli exist, the human and the bovine. Out of fifty-six cases of human tuberculosis examined fifty showed human bacilli only, five (three being children) showed bovine bacilli, while the remaining one showed both human and bovine bacilli.

A MOVEMENT has been initiated in Denmark for the erection of a monument to the late Prof. Finsen, the inventor of the light cure for lupus. It has been thought that many outside Denmark would desire to join in doing honour to one who did so much for his fellow-men, and a British committee has been formed for the furtherance of the scheme. The Hon. Sydney Holland, Sir Francis Laking, Sir Frederick Treves, and Mr. Malcolm Morris, members of this committee, announce that subscriptions may be paid to the Finsen Memorial Fund at the National Provincial Bank, 112 Bishopsgate Street, E.C.

THE Bradshaw lecture was delivered at the Royal College of Surgeons on December 1 by Mr. Mayo Robson, who took for his subject the treatment of cancer. He pointed out that in many instances, perhaps in all if we only knew it, there was a pre-cancerous stage in which operation ought to be performed, and would be the means of saving many

lives. In early operation with complete removal of disease, together with a wide margin of healthy tissue, our hope of cure must depend. Medical treatment could not cure, and could do little to prolong life. There was hardly any situation in the body in which an operation for removal could not be performed provided the disease were recognised sufficiently early, and the results of surgical treatment were by no means so hopeless as generally supposed.

WE learn from the *Athenaeum* that M. Paul Tannery, whose death is announced, was born at Mantes on December 20, 1843, was president of the Congrès d'Histoire Générale des Sciences held at Paris in 1900, and had written extensively on philosophical subjects since 1876. His principal works include "Pour l'Histoire de la Science Hellène," 1887, and "Recherches sur l'Histoire de l'Astronomie Ancienne," 1893; he edited with M. Ch. Henry the works of Fermat, and with M. Ch. Adam an edition of Descartes.

PRINCE ROLAND BONAPARTE has resumed the presidency of the committee of the Aéro Club of Paris, which he had previously to relinquish on account of ill-health. At the meeting of the club on November 28, the report of the St. Petersburg congress was read. The suggestion was made to ask the Government to lend a torpedo-boat for experiments in starting sounding-balloons over the Mediterranean when the scientific congress meets at Algiers next April. In connection with proposed ascents during the solar eclipse of August 30, 1905, it is unfortunate that one of the towns having the best situation on the line of totality—from Philippeville to Sfax—Batna, with a population of 6000 or 7000, is lighted by electricity, and there is no gas reservoir. It will therefore be necessary for the aéronauts to manufacture hydrogen on the spot, or else to bring it from a distance.

THE following are among the lecture arrangements at the Royal Institution, before Easter:—a Christmas course of lectures (experimentally illustrated and adapted to a juvenile auditory) on ancient and modern methods of measuring time, by Mr. Henry Cunynghame; Prof. L. C. Miall, adaptation and history in the structure and life of animals; Prof. Karl Pearson, some recent biometric studies; Prof. W. E. Dalby, engineering; Mr. A. H. Savage Landor, exploration in the Philippines; Prof. W. Schlich, forestry in the British Empire; Mr. J. J. H. Teall, recent work of the Geological Survey; Prof. H. H. Turner, recent astronomical progress; Prof. R. Meldola, synthetic chemistry (experimental); Mr. D. G. Hogarth, archaeology; Prof. J. J. Thomson, electrical properties of radio-active substances; and Lord Rayleigh, some controverted questions of optics. The Friday evening meetings will begin on January 20, when a discourse will be delivered by Sir James Dewar on new low temperature phenomena; succeeding discourses will probably be given by Dr. E. A. Wilson, Mr. Cecil Smith, Mr. J. W. Gordon, Prof. H. Marshall Ward, Chevalier G. Marconi, Prof. J. J. Thomson, Prof. G. H. Bryan, Prof. J. Wright, Prof. T. Clifford Allbutt, Lord Rayleigh, and other gentlemen.

THE new board of anthropological studies in Cambridge is now organised, and commenced work last October with nine courses of lectures. Sir Richard Temple, Bart., C.I.E., delivered an inaugural address at Cambridge in the museum of archaeology and ethnology on "The Practical Value of Anthropology." In the course of his most interesting and suggestive address he said:—"Now, when we are started on a new line of research, when we add a new course of studies to a university curriculum, there is a question that

we cannot help facing—a question, in fact, that ought to arise—What is the good of it all?" From his long experience as an administrator in the East, Sir Richard Temple drew, from facts that had come under his own observation, examples of the desirability, one would like to add the necessity, of a knowledge of ethnology for those who are brought into contact with alien peoples, and he dealt severally with merchants and planters, administrators and magistrates, and missionaries. He also pointed out that stay-at-home critics require training and information, as by their ignorant criticism they are liable to do a great deal of actual harm. "But mischievous as uninformed criticism is, there is nothing of greater value and assistance than the criticism of the well informed." He alluded to the value of anthropological study to history, and after dealing with the value of an early anthropological training to a man in his work, he pointed out the value it is in his private life, even if it is pursued merely as a hobby. "Not only will it enable the student to do the work of the world and to deal with his neighbours and those with whom he comes in contact, throughout all his active life, better than can be otherwise possible, but it will serve to throw a light upon what goes on around him, and to give an insight into human affairs, past and present, that cannot but be of benefit to him, and it will provide him with intellectual occupation, interest and pleasure, as long as eye can see, or the ear can hear, or the brain can think." The address is printed in full in the *Cambridge Reporter* (vol. xxvi., No. 643).

ACCORDING to "Notes for Visitors to the Gezira Aquarium," issued by the Public Works Department of Cairo in November, the tanks at that establishment contained specimens of no less than twenty-nine species of native fishes, including the Nile perch, the electrical catfish, and the elephant-fish (*Mormyrus*).

WE have received from the author, Dr. W. G. Ridewood, two papers on the osteology of the skull in some of the more generalised families of bony fishes, the one published in the *Proceedings of the Zoological Society*, and the other in the *Journal of the Linnean Society*. Some remarks on the general morphology of the skull are appended to the former paper.

THE *Emu* for October contains reproductions of two very interesting photographs, the first showing the "run" or "play-house" of the great bower-bird (*Chlamydera nuchalis*), and the second a flight of bare-eyed cockatoos (*Cacatua gymnopis*), estimated at between sixty and seventy thousand in number. Considerable interest attaches to a note on bird-sanctuaries in New Zealand, where, it appears, all the surviving flightless species are now protected by Government. The want of such sanctuaries, both for birds and mammals, in Australia forms the subject of comment in another paragraph.

To vol. lxxviii., part ii., of the *Zeitschrift für wissenschaftliche Zoologie*, Mr. A. Voss, of Dusseldorf, contributes the first instalment of an essay on the comparative anatomy and mechanics of insect structure, especially in relation to flight, commencing with the thorax of the house-cricket in relation to the attachment of the wings and their movements. The other articles include one by Dr. P. Dugener on the scent-organ of the butterfly *Phassus schamyl* and the function of the same; a second, by Dr. H. Jordan, on the digestive organs of the sea-mouse (*Aphrodite aculeata*); a third, by Mr. L. von Graff, on the marine turbellarian worms of Orotava and the coast of Europe; and a fourth,

by Dr. S. Gross, on the perineal sac and its glands of the guinea-pig.

IN the *Zoologist* for November Mr. O. V. Aplin announces that the black-necked grebe (*Podicipes nigricollis*) should be added to the list of birds nesting in the British Islands. It appears that during the past summer several pairs of these grebes successfully reared their young within our islands, but for obvious reasons neither the locality where this interesting event took place nor the name of the observer by whom it was recorded are revealed to the public. Pennant, it seems, stated that the black-necked grebe nested in the Lincolnshire fens near Stamford in his time, and the late Mr. E. T. Booth had a pair of nestlings brought to him by a marshman; but the observations of this year form the first definite record of the nest having been actually seen. A second article in the same journal is devoted to notes on natural history made during the cruise round the world of Lord Crawford's yacht *Valhalla* in 1902-3 by Mr. M. J. Nicoll. Among new forms obtained during the voyage, the author refers to *Pyroderecs crawfordi*, belonging to the Microlepidoptera, and the fish *Corvina crawfordi*. He also records his own observations on the flight of flying fish, and is one of those who believe that they move their "wings."

THE Danish Commission for the Study of the Sea, which is charged with carrying out the Danish portion of the cooperative international investigations, has issued the first memoirs of its report, which is published under the title "Meddelelser fra Kommissionen for Havundersøgelser." The report, which is to be written in English or German, and is issued in quarto form, uniform with the *Bulletin* of the Central Bureau of the International Council, is divided into three series, dealing respectively with fisheries, with hydrography, and with plankton. Of the fisheries series one memoir is now published, viz. C. G. Joh. Petersen, on the larval and post-larval stages of the long rough dab and the genus *Pleuronectes* (with two plates); of the hydrographic series three memoirs, Martin Knudsen, on the organisation of the Danish hydrographic researches, H. J. Hansen, experimental determination of the relation between the freezing point of sea-water and its specific gravity at 0° C., Niels Bjerrum, on the determination of chlorine in sea-water and examination of the accuracy with which Knudsen's pipette measures a volume of sea-water; and of the plankton series two memoirs, Ove Paulsen, plankton investigations in the waters round Iceland, C. H. Ostenfeld, on two new marine species of Heliozoa occurring in the plankton of the North Sea and the Skager Rak. The memoirs are of interest as being amongst the first fruits of the international scheme of cooperative research. They are, however, all short memoirs, dealing with what may be considered as side issues of the main investigations, the reports upon which must be looked for at a later date. The Danish Commission, which is appointed by the Danish Board of Agriculture, consists of Prof. C. G. Joh. Petersen (chairman), C. F. Drechsel, C. H. Ostenfeld, and Martin Knudsen (secretary).

THE important preliminary results of the National Antarctic Expedition have already been utilised by Mr. W. Krebs in the communication of a useful paper to *Das Weltall* (vol. iv., Heft 24). By comparison of the yearly temperature at the English, German, and Swedish stations during the year 1902-3, he finds that the average decrease of temperature amounted to 0.5° C. for each degree of latitude; and by applying this value to the results obtained by the five stations established round the Antarctic Pole during the

years 1898-1903, he has constructed approximate isotherms between 50° and 80° S. latitude, and thus made an important addition to the valuable yearly isothermal charts published in Dr. Hann's "Handbook of Meteorology." Dr. Hann's southernmost isobar is 4° C., just below Tierra del Fuego; Mr. Krebs continues the isotherms for each 4° C. as far as -16° , which runs near the 70th parallel between longitude 60° E. and 60° W. He also draws portions of the isotherm of -20° C., reaching nearly to the 80th parallel.

THE *Times* of November 29 contains an interesting article on London fogs; although it deals principally with the most elementary physics of the atmosphere, and with the part played by aqueous vapour, the subject is very ably handled and is made both attractive and instructive. The author points out the well known facts that the amount of invisible vapour in the air varies directly with the temperature; by whatever process the cooling of the air takes place, the capacity of the vapour to remain invisible diminishes until the "dew point" or "saturation point" is reached; any further cooling produces cloud or fog. He states that it is more than twenty years since it was shown that the vapour molecules cannot of themselves combine to form cloud or fog particles, but that solid nuclei of dust, or other impurities, are necessary, on which the vapour molecules can condense. Taking this for granted, it is seen at once why fogs in London (or other large towns) are so much denser than in the open country. For instance, at an elevation of 6000 feet, say on the Alps, the number of dust particles per cubic centimetre may amount to less than 200, while in towns the number may reach 100,000 or 200,000. The vapour in the country, condensed on a few particles of dust, will result in a coarse grained form of condensation, whereas in town the same quantity of vapour being distributed over a very large number of dust particles, there results a fine grained fog. The author points out that it is not the large-sized visible dust that does the damage, but the infinitely small, ultra-microscopic particles produced by combustion of fuel and light; that, in fact, experiments have shown that it is possible for cloudy condensation to take place in the absence of dust. In 1897 (*Trans. Roy. Soc. Edin.*, vol. xxxix.) Mr. Aitken stated that dust particles are not absolutely essential for the production of fog, but that, as the air is full of dust and condensation takes place on these by preference, therefore practically all our cloud particles have dust nuclei. The author concludes, justly, we are afraid, that London will always be liable to fogs, owing to its situation and meteorological conditions; all that can be hoped for is a reduction in the more disagreeable constituent elements; there seems to be, so far, no way of appreciably reducing their frequency or their bad effects. We hope that the experiments begun by Sir Oliver Lodge, with a view to their possible ultimate dissipation by electricity, will be energetically continued.

THE *Revue Scientifique* (Nos. 20 and 21), in continuing its inquiries as to the existence of the *n*-rays, publishes a letter from M. Blondlot stating that the photographic exposures, the results of which he considers prove the reality of these radiations, were made by a laboratory assistant who was ignorant of the effects he ought to obtain, and was therefore not unconsciously biased. The obvious rejoinder is made that the results obtained in this way are less to be trusted than if they were due to M. Blondlot himself. M. Lambert claims that his experiments showing that the *n*-rays exist were made in a manner excluding subjective phenomena. On the other hand, MM. Cailletet, Lippmann,

Berget, Turpaine, and Perrin have all failed to obtain experimental proof of their existence.

PART X. of the *Transactions* of the Royal Dublin Society contains a continuation of the researches of Messrs. W. F. Barrett, W. Brown, and R. A. Hadfield on the physical properties of a series of alloys of iron. It is shown that a remarkable similarity exists between the diminution of the electrical conductivity and the change in the thermal conductivity of iron, which are caused by the addition of other elements. Not only is the general order of the electrical and thermal conductivities the same for all the alloys, but equal increments of any given element appear to produce a corresponding diminution of conductivity for both heat and electricity. It is remarkable that the effect of alloying iron with another element, even a better conductor, is always to reduce both the thermal and the electrical conductivities. The ratio of the two conductivities is, however, not exactly the same for all alloys; on plotting the electrical against the thermal conductivity, a fairly smooth parabolic curve is obtained showing that the ratio increases in magnitude as the conductivity of the alloys increases.

THE October part of the *Physical Review* contains an account by Messrs. C. W. Waidner and G. K. Burgess of a number of measurements which they have made by photometric methods of the temperature of the electric arc. Wien's law of the distribution of energy in the spectrum was assumed as a basis of calculation, and three distinct types of photometers, namely, those of Holborn and Kurlbaum, of Wanner, and of Le Chatelier, were employed. The values obtained for the "black body" temperature of an arc of pure graphite by the three methods agreed within 30° C., the average being about 3700° abs. The true temperature of the arc must be higher than this by an amount depending on the departure of the radiation from true "black body" radiation, and may possibly be between 3900° and 4000° absolute. Contrary to the usually accepted view, the temperature of the arc does not appear to be independent of the current, and it is undoubtedly influenced by the degree of purity of the carbons forming the arc. With impure carbons, the temperature is lower by 40° C. than in an arc of highly purified graphite. Such variations would appear to preclude the suggested use of the brightest part of the positive carbon of the electric arc as a standard source of light.

THE second number of the *Extensionist*, which is a record of the University Extension Guild, has reached us. In addition to numerous descriptive notes on the work of the guild, this issue contains addresses by Sir Arthur Rucker, F.R.S., Mr. Hilaire Belloc, and Mr. Banister Fletcher.

THE Infants' Health Society has published a pamphlet entitled "The Present Conditions of Infant Life, and their Effect on the Nation," which directs attention to the almost complete failure of our present method of rearing the infants of the working class. In the poorer parts of the larger towns and cities it is not uncommon for nearly half the children born to die in infancy. The dominating cause of this appalling mortality is the improper feeding of the infant.

MESSRS. A. AND C. BLACK have published the 1905 issues of three useful annuals—"Who's Who," "Who's Who Yearbook," and the "Englishwoman's Yearbook." "Who's Who" has been enlarged again this year, nearly a hundred pages having been added, bringing the total up to 1796. Due prominence is given to men of science and their work, not only of those in this country, but in other parts of the world. There is a want of uniformity in the

amount of detail given concerning the careers of the notabilities included, and something might be done with advantage to reduce the lengths of some of the biographies, and thus to keep the volume of a convenient size. The "Who's Who Yearbook" contains the tables which were formerly included in "Who's Who" itself. "The Englishwoman's Yearbook" will in its revised form continue to lighten the labours of women sharing in the useful work of the world.

OUR ASTRONOMICAL COLUMN.

RE-DISCOVERY OF TEMPEL'S SECOND COMET.—A telegram from the Kiel Centralstelle announces that Tempel's second comet was re-discovered by M. Gavelle at Nice on November 30, and that the observation showed the daily ephemeris published in No. 3971 of the *Astronomische Nachrichten* to be nearly correct.

The following is an extract from the above named ephemeris, which was published by M. J. Coniel :—

12h. M.T. Paris.

1904	α (app.)	δ (app.)	$\log \Delta$	1:22 ²
	h. m. s.			
Dec. 8 ...	20 7 38	-24° 19'	0.29671	... 0.126-
" 10 ...	20 15 4	-24 8	0.29913	
" 12 ...	20 22 26	-23 56	0.30161	... 0.122
" 14 ...	20 29 47	-23 42	0.30414	
" 16 ...	20 37 4	-23 28	0.30672	... 0.117
" 18 ...	20 44 19	-23 12	0.30936	
" 20 ...	20 51 30	-22 55	0.31206	... 0.113

PARALLAX OF A LOW METEOR.—Whilst exposing on the Andromeda nebula with two Voigtlander objectives on August 12 Herr P. Götz, of Heidelberg, photographed on each plate the trail of a remarkably low Perseid. From measurements of the trail on the two plates it was possible to determine the parallax of the meteor at definite points in its flight where the trail was considerably strengthened. The result showed a mean parallax of 28".12, whilst for six distinct points on the trail the following parallaxes were determined :—

28".26, 37".31, 27".78, 25".20, 17".14, 10".0.

The base of the triangle Meteor—Voigtlander I.—Voigtlander II. measured 68 cm., and it therefore follows that the distance of the meteor at each of these points was 4.98, 3.78, 5.05, 5.57, 8.27, 14.03 kilometres respectively, the coordinates of the meteor at each point being respectively :

$\alpha = \text{oh. } 28^{\circ} 2\text{m.}, \text{oh. } 22\text{m.}, \text{oh. } 19^{\circ} 2\text{m.}, \text{oh. } 16^{\circ} 8\text{m.}, \text{ob. } 10^{\circ} 7\text{m.}$
 $\delta = +43^{\circ} 13', +42^{\circ} 1', +41^{\circ} 28', +40^{\circ} 58', +39^{\circ} 47', +38^{\circ} 59'.$

The path of the meteor was apparently rectilinear, but the observations indicated that it described a sharp curve in the third dimension with the convex side towards the observer.

The path of the meteor extended from $\alpha = \text{oh. } 33^{\circ} 6\text{m.}, \delta = +44^{\circ} 17'$ to $\alpha = 23\text{h. } 52^{\circ} 2\text{m.}, \delta = +35^{\circ} 28'$ (*Astronomische Nachrichten*, No. 3975).

DATE OF THE MOST RECENT SUN-SPOT MINIMUM.—From a discussion of the observations of solar phenomena made at the Roman College Observatory during the period November 25, 1900, to January 4, 1902, Signor E. Tringali deduces the date of the latest sun-spot minimum to have been June 15, 1901, or 1901-45.

In Table i. of the communication the relative daily frequencies of spots, &c., are given for the years 1878-9 and 1888-1903, and it is seen that the frequency of days without spots during 1901 was greater than obtained during the previous minimum (1889), but less than in the 1878 minimum. The numbers given for 1878 and 1901 are 0.76 and 0.73 respectively (*Memorie della Società degli Spettroscopisti Italiani*, No. 8, vol. xxxiii.).

OBSERVATIONS OF PERSEIDS, 1904.—In No. 9, vol. xxxiii., of the *Memorie della Società degli Spettroscopisti Italiani*, Prof. S. Zammarchi, director of the meteorological observatory at Brescia, gives in tabular form the results of the observations of Perseids made at that observatory during the nights of August 9-14.

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531 Perseids were seen, and the observations are recorded in the order of the appearance of the objects, the time, the points of appearance and disappearance, and the general characteristics of each meteor being given.

THE ORBIT OF SIRIUS.—In No. 3981 of the *Astronomische Nachrichten* Prof. Döberck gives the results of a discussion of the observations of Sirius and its faint companion, and includes a set of elements; an éphéméris for the period 1903-2-1917-2, and a table showing the differences between the observed and calculated values of position angle and distance. Owing to the great difference between the magnitudes of the two components, the systematic errors of observation are unusually large.

The following are the elements determined from the discussion :—

$\Omega = 225^{\circ} 49'$	$P = 49^{\circ} 49$ years
$\lambda = 29^{\circ} 54'$	$T = 1894^{\circ} 28$
$\gamma = 43^{\circ} 20'$	$a = 7'' 513$
$e = 0^{\circ} 5871$	

The orbit is referred to the equinox of 1900. The motion is retrograde, and the anomalies are considered as positive before and negative after periastron.

The consideration of the errors of observation shows that they are inversely proportional to the aperture of the object glass employed.

HARVARD OBSERVATIONS OF VARIABLE STARS. Part ii., vol. xlvi., of the Harvard College Observatory *Annals* is devoted to the observations, chiefly of variable stars, made by Prof. E. C. Pickering with the meridian photometer during the years 1892-8.

The first chapter gives the results of the observations of short-period variables, and then discusses the phases of the light-variations and the corrections to their ephemerides. Chapter ii. deals similarly with the observations of variables of the Algol type, chapter iii. collates the observations of various miscellaneous objects, and the fourth chapter gives, and discusses, the observations of planets and asteroids. The early observations of variable stars, at Harvard, are collected into tables in the fifth chapter, whilst the last chapter discusses the observations of long-period variables, and describes the eight light-curves given on the two plates at the end of the volume.

CORRECTION OF THE LONGER TERM IN THE POLAR MOTION.—In a previous communication to the *Astronomische Nachrichten* Mr. Kimura, of the Mizusawa International Latitude Station, showed that the cycle of the polar motion might be approximately represented by two principal terms of 365 and 438 days.

In No. 3981 of the same journal, however, he discusses the latter term more fully, from observations made during the period 1890-1904, and finds that it is probably a day or two too long. Taking the two periods 1890-1896 and 1896-1902, he derived the value 437.1 days, whilst from the periods 1892-1898 and 1898-1904 the value 436.6 days was obtained. The latter value, Mr. Kimura thinks, is likely to be the more correct, and consequently the cycle is not exactly six years as was indicated by the former discussion.

The values given in the paper show that for the years 1890 and 1891 the radius of the circular motion was especially large, but from 1892 to last year it remained nearly constant.

ARC SPECTRA OF THE ALKALI METALS.—In No. 9, vol. xi., of the *Proceedings* of the American Academy of Arts and Sciences Mr. F. A. Saunders, of Syracuse University, gives the results of a series of researches on the arc spectra of lithium, sodium, potassium, rubidium, and caesium.

The salts were vaporised on nearly pure carbon poles, and the spectra were taken with a grating camera, special arrangements being made to photograph the spectra well up into the red.

Several new lines, which fit into the respective series, were discovered, and in the lithium spectrum Mr. Saunders believes that the dual character of the lines is real and not simply due to reversals as has been supposed by Hagenbach and other spectroscopists.

A comparison of the arc spectra with spark spectra of the same substances showed no relative enhancement of any of the lines in passing from the conditions of the arc to those of the spark.